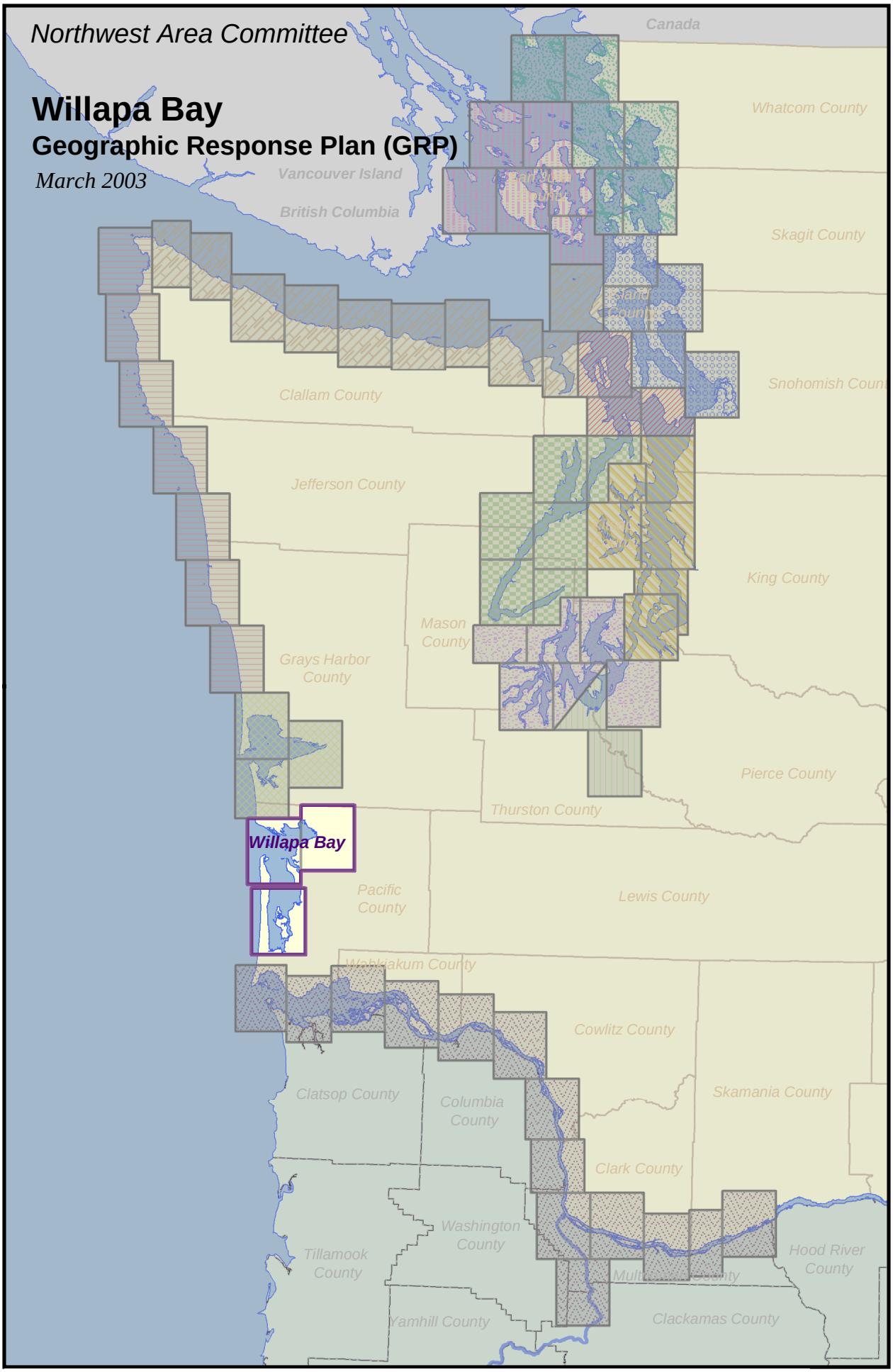
Washington State Department of Ecology Publication No. 03-08-009



SPILL RESPONSE CONTACT SHEET

Required Notifications For Hazardous Substance or Oil Spills

USCG National Response Center ..... **(800) 424-8802**
In Oregon:
Department of Emergency Management ..... **(800) 452-0311**
In Washington:
Emergency Management Division ..... **(800) 258-5990**
Department of Ecology Northwest Regional Office ..... **(425) 649-7000**
Department of Ecology Southwest Regional Office ..... **(360) 407-6300**

U.S. Coast Guard

National Response Center	**(800) 424-8802**
Marine Safety Office Puget Sound:	
Watchstander	**(206) 217-6232**
Safety Office	(206) 217-6232
Marine Safety Office Portland:	
Watchstander	**(503) 240-9301**
Safety Office	(503) 240-9379
Pacific Strike Team	**(415) 883-3311**
District 13:	
MEP/drat	(206) 220-7210
Command Center	(206) 220-7001
Public Affairs	(206) 220-7237
Vessel Traffic Service (VTS)	**(206) 217-6050**

Environmental Protection Agency (EPA)

Region 10 Spill Response	**(206) 553-1263**
Washington Ops Office	(360) 753-9083
Oregon Ops Office	(503) 326-3250
Idaho Ops Office	(208) 334-1450
RCRA/ CERCLA Hotline	(800) 424-9346
Public Affairs	**(206) 553-1203**

National Oceanic Atmosphere Administration

Scientific Support Coordination	(206) 526-6829
Weather	(206) 526-6087

Canadian

Marine Emergency Ops/Vessel Traffic	(604) 666-6011
Environmental Protection	(604) 666-6100
B.C. Environment	(604) 356-7721

Department of Interior

Environmental Affairs	(503) 231-6157
	(503) 621-3682

U.S. Navy

Naval Shipyard	**(360) 476-3466**
Naval Base Seattle	(360) 315-5440
Supervisor of Salvage	**(202) 695-0231**

Army Corps of Engineers

Hazards to Navigation	(206) 764-3400

Shoalwater Bay Tribe

Tribal Office	(360) 267-6766
After Hours Emergencies	(360) 267-6766 ext. 139

Federal O.S.R.O./ State Approved Response Contractors

All Out Indust. & Env. Services	(360) 414-8655
Certified Cleaning Services, Inc.	(253) 536-5500
Clean Sound Cooperative, Inc.	**(425) 783-0908**
Cowlitz Clean Sweep, Inc.	(360) 423-6316
FOSS Environmental	**(800) 337-7455**
Global Diving and Salvage	(206) 623-0621
Guardian Industrial Services, Inc.	(253) 536-0455
Matrix Service, Inc.	(360) 676-4905
MSRC	(425) 252-1300
National Response Corporation	(206) 340-2772
Tidewater Environmental	(503) 289-4274
&	(360) 695-8088

Washington State

Department of Ecology Headquarters	(360) 407-6900
Southwest Region	**(360) 407-6300**
Northwest Region	**(425) 649-7000**
Central Region	**(509) 575-2490**
Eastern Region	**(509) 456-2926**
Department of Fish and Wildlife	**(360) 534-8233**
Emergency Management Division	(360) 438-8639
	(800) 258-5990
State Patrol	
Bellevue	(425) 455-7700
Tacoma	(253) 536-6210
Bremerton	(360) 478-4646
Vancouver	(360) 260-6333

Oregon State

Department of Environmental Quality	(503) 229-5733
Emergency Management	**(503) 378-6377**
	(800) 452-0311

HOW TO USE THIS GEOGRAPHIC RESPONSE PLAN

Purpose of Geographic Response Plan (GRP)

This plan prioritizes resources to be protected and allows for immediate and proper action. By using this plan, the first responders to a spill can avoid the initial confusion that generally accompanies any spill.

Geographic Response Plans are used during the emergent phase of a spill which lasts from the time a spill occurs until the Unified Command is operating and/or the spill has been contained and cleaned up. Generally this lasts no more than 24 hours. The GRPs constitute the federal on-scene coordinators' and state on-scene coordinators' (Incident Commanders) "orders" during the emergent phase of the spill. During the project phase, the GRP will continue to be used, and the planned operation for the day will be found in the Incident Action Plan's Assignment List (ICS Form 204). The Assignment List is prepared in the Planning Section with input from natural resource trustees, the Incident Objectives (ICS Form 202), Operations Planning Worksheet (ICS Form 215), and Operations Section Chief.

Strategy Selection

Chapter 4 contains complete strategy descriptions in matrix form, response priorities, and strategy maps. The strategies depicted in Chapter 4 should be implemented as soon as possible, following the priority table in Section 2 with the "Potential Spill Origin" closest to the actual spill origin. These strategy deployment priorities may be modified by the Incident Commander(s) after reviewing on scene information, including: tides, currents, weather conditions, oil type, initial trajectories, etc.

It is assumed that control and containment at the source is the number one priority of any response. If, in the responder's best judgment, this type of response is infeasible then the priorities laid out in Chapter 4, Section 2 take precedence over containment and control.

It is important to note that strategies rely on the spill trajectory. A booming strategy listed as a high priority would not necessarily be implemented if the spill trajectory and booming location did not warrant action in that area. However, the priority tables should be followed until spill trajectory information becomes available, and modifications to the priority tables must be approved by the Incident Commander(s).

The strategies discussed in this GRP have been designed for use with persistent oils and may not be suitable for other petroleum or hazardous substance products. For hazardous substance spills, refer to the Northwest Area Contingency Plan, Chapter 7000.

Standardized Response Language

In order to avoid confusion in response terminology, this GRP uses standard National Interagency Incident Management System, Incident Command System (NIIMS, ICS) terminology and strategy names, which are defined in Appendix A, Table A-1 (e.g. diversion, containment, exclusion).

Willapa Bay
Geographic Response Plan

Record of Changes

Date	Change Number	Summary of Changes	Initials of Person Making Change
	N/A	Origianl Release	N/A
March 1994	1	Entire GRP replaced w/ up-dated, reformated version	
March 2003	2nd Change	Update of Chapter 4 using GIS based maps, and new priority tables based on trajectory modeling.	D Davis

Table of Contents

GEOGRAPHIC RESPONSE PLAN

1. INTRODUCTION: SCOPE OF THIS PROJECT

Geographic Response Plans are intended to help the first responders to a spill avoid the initial confusion that generally accompanies any spill. This document serves as the federal and state on-scene-coordinators "orders" during a spill in the area covered by this GRP (see Chapter 3 for area covered). As such, it has been approved by the U.S. Coast Guard Marine Safety Office and the Washington State Department of Ecology Spills Program. Changes to this document are expected as more testing is conducted through drills, site visits, and actual use in spill situations. To submit comments, corrections, or suggestions please refer to Appendix C.

GRPs have been developed for the marine and inland waters of Washington, Oregon, and Idaho. They are prepared through the efforts and cooperation of the Washington Department of Ecology, Washington Department of Fish and Wildlife, Oregon Department of Environmental Quality, Idaho State Emergency Response Commission, the U.S. Coast Guard, the Environmental Protection Agency, tribes, other state and federal agencies, response organizations, and local emergency responders.

GRPs were developed through workshops involving federal, state, and local oil spill emergency response experts, response contractors, and representatives from tribes, industry, ports, environmental organizations, and pilots. Workshop participants identified resources which require protection, developed operational strategies, and pinpointed logistical support. A similar process has been used for major updates.

Following the workshops, the data gathered was processed and reproduced in the form of maps and matrices which appear in Chapters 4 through 6. The maps in Chapters 5 and 6 were generated using Canvas. Maps for Chapter 4 were generated using ArcView GIS. The matrices were created using MS Excel, and the balance of each GRP was produced using MS Word.

The first goal of a GRP was to identify, with the assistance of the Washington State Natural Resource Damage Assessment Team, resources needing protection; response resources (boom, boat ramps, vessels, etc.) needed, site access and staging, tribal and local response community contacts, and local conditions (e.g. physical features, hydrology, currents and tides, winds and climate) that may affect response strategies. Note that GRPs only address protection of sensitive **public** resources. It is the responsibility of private resource owners and/or potentially liable parties to address protection of private resources (such as commercial marinas, private water intakes, and non-release aquaculture facilities).

Secondly, response strategies were developed based on the sensitive resources noted, hydrology, and climatic considerations. Individual response strategies identify the amount of boom necessary for implementation. The response strategies are then applied to Potential Spill Origins and trajectory modeling, and prioritized, taking into account factors such as resource sensitivity, feasibility, wind, and tidal conditions.

Draft strategy maps and matrices were sent out for review and consideration of strategy viability. Field verification was conducted for some strategies, and changes proposed by the participants were included in a semi-final draft, which was offered for final review to all interested parties and the participants of the field verification.

Finally, the general text of the GRP was compiled along with the site description, reference maps, and logistical support.

Items included in Logistical Support:

- Location of operations center for the central response organization;
- Local equipment and trained personnel;
- Local facilities and services and appropriate contacts for each;
- Site access & contacts;
- Staging areas;
- Helicopter and air support;
- Local experts;
- Volunteer organizations;
- Potential wildlife rehabilitation centers;
- Marinas, docks, piers, and boat ramps;
- Potential interim storage locations, permitting process;
- Damaged vessel safehavens;
- Vessel repairs & cleaning;
- Response times for bringing equipment in from other areas.

2. Site Description

Willapa Bay is a 100 square-mile estuary situated along the southern coast of Washington and is one of the most important estuaries on the West Coast. The bay has an ideal oyster growing habitat, and supports a wide diversity of wildlife.

Willapa Bay is considered to be one of the most productive bays along the Pacific. Salmon, bottom fish, oysters, crabs, clams, and shrimp are harvested from bay waters. The bay features mud and gravel beaches and saltgrass shores interspersed with wetlands and tidal flats. 20,000 acres of the bay has been set aside as a National Wildlife Refuge for habitat protection.

2.1. Physical Features

Steeply rising uplands border the bay to the north and east. To the south, across a low ridge, lies the Columbia River. The western margin of the bay is formed by a long, narrow sand spit – North Beach Peninsula – apparently formed by deposits from the Columbia River.

2.2. Hydrology

The drainage basin of Willapa Bay encompasses approximately 720 square miles, including most of Pacific County and portions of Grays Harbor, Lewis, and Wahkiakum counties. Rivers that flow into the bay include the Cedar, North, Willapa, Bone, Niawaikum, Palix, Nemah, Naselle, and Bear. Freshwater inflow into the bay from tributaries is low. The combined average daily runoff of all the rivers is approximately 0.004% of the bay volume.

2.3. Currents and Tides

A majority of Willapa Bay is broad and shallow with about 55 percent of the area exposed at lower tides. The difference in the volume of water between highest tides and lowest tides is approximately 45 percent of the bay volume. At mean high water, Willapa Bay covers about 79,000 acres, while at mean lower low water about 32,000 acres of bottom are exposed and 11,600 acres are shallower than six feet.

Conditions in the ocean determine how much water leaving the bay will return on the next incoming tide. According to the Army Corps of Engineers (1976), periods of ocean upwelling in summer promote thorough mixing of bay water and ocean water. Mixing may occur during storm periods with high wave actions. At other times, a plume of water from the Columbia River, acting as a discrete mass of water, tends to prevent mixing from occurring. Water from the bay can then move back and forth for several days.

The ocean current along the Washington coast reverses direction between summer and winter; the California current moves south in the summer and the Davidson inshore current moves north in the winter.

2.4. Winds

During the fall and winter, there is a prevailing flow of warm, moist air from a southwesterly direction. During the winter, weather disturbances crossing the North Pacific follow a southerly course that results in an increased number of storms striking the Washington coast. The frequency of storms over the North Pacific decreases in the spring, and the prevailing wind shifts to westerly, and then northwesterly by early summer. In the fall, the winds again come from a westerly direction.

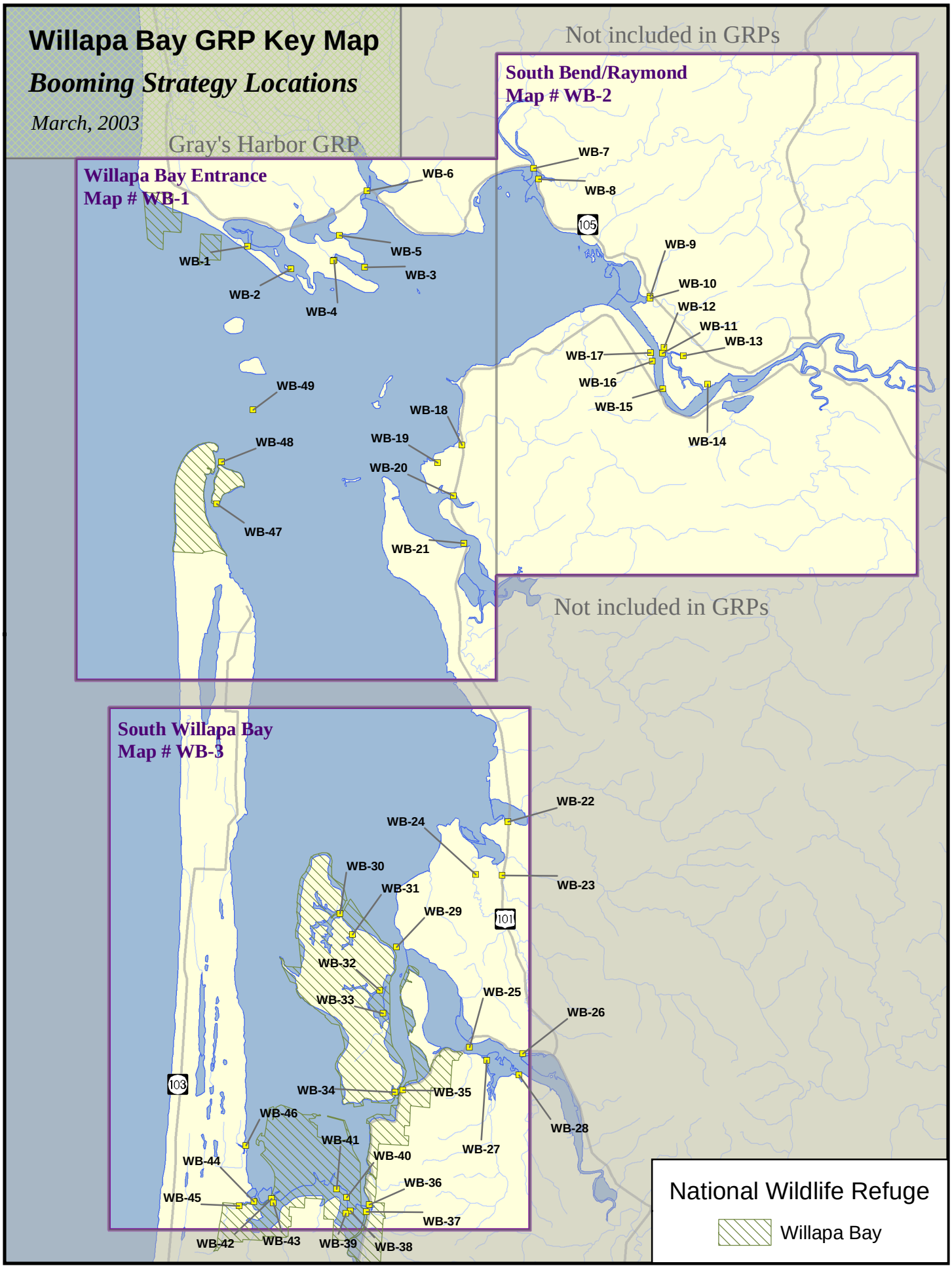
If oil is spilled offshore, prevailing winds will play a role in spill direction depending on the season:

In the winter, the predominant winds are from the south and the current is circulating north. If oil is spilled offshore south of Willapa Bay, and it enters the mouth, it can be expected to hit the northern shore of the bay. If the spill does not enter Willapa Bay, the North Coast shoreline will be vulnerable.

In the summer, the predominant winds are from the north. The summer winds are persistent, but not as strong as the winter winds. Oil may enter Willapa Bay from the north and spread south. The increasingly variable nature of the winds in the spring, summer, and fall may reduce the predictability of the spill direction once it enters Willapa Bay.

2.5. Climate

The climate of the Willapa Bay basin is the marine west coast type, characterized by cool, dry summers and moderate winters with heavy rainfall ranging from 65 to 120 inches per year, depending on location.


Willapa Bay GRP Key Map
Booming Strategy Locations
March, 2003
Gray's Harbor GRP
Not included in GRPs
South Bend/Raymond
Map # WB-2
Willapa Bay Entrance
Map # WB-1
WB-1
WB-2
WB-3
WB-4
WB-5
WB-6
WB-7
WB-8
WB-9
WB-10
WB-11
WB-12
WB-13
WB-14
WB-15
WB-16
WB-17
WB-18
WB-19
WB-20
WB-21
WB-47
WB-48
WB-49
105
Not included in GRPs
South Willapa Bay
Map # WB-3
WB-22
WB-23
WB-24
WB-25
WB-26
WB-27
WB-28
WB-29
WB-30
WB-31
WB-32
WB-33
WB-34
WB-35
WB-36
WB-37
WB-38
WB-39
WB-40
WB-41
WB-42
WB-43
WB-44
WB-45
WB-46
101
103
National Wildlife Refuge
Willapa Bay

4. GENERAL PROTECTION/COLLECTION STRATEGIES

4.1. Chapter Overview

This chapter details the specific response strategies and resources to protect as outlined by the participants of the GRP workshop for the Willapa Bay area. It describes the strategies determined for each area and the prioritization of those strategies. Note that GRPs only address protection of sensitive **public** resources. It is the responsibility of private resource owners and/or potentially liable parties to address protection of private resources (such as commercial marinas, private water intakes, and non-release aquaculture facilities).

Maps & Matrices

The maps in this chapter provide information on the specific location of booming strategies. They are designed to help the responder visualize response strategies. Details of each booming strategy are listed in corresponding matrix tables. Each matrix indicates the exact location, intent and implementation of the strategy indicated on the map. The "Status" column describes whether the strategy has been visited or tested in the field, and the date of the visit/test. Most strategies include a number for the corresponding shoreline photo, which is available on the Washington Department of Ecology's internet site at http://www.ecy.wa.gov/apps/shorephotos/.

Major Protection Techniques

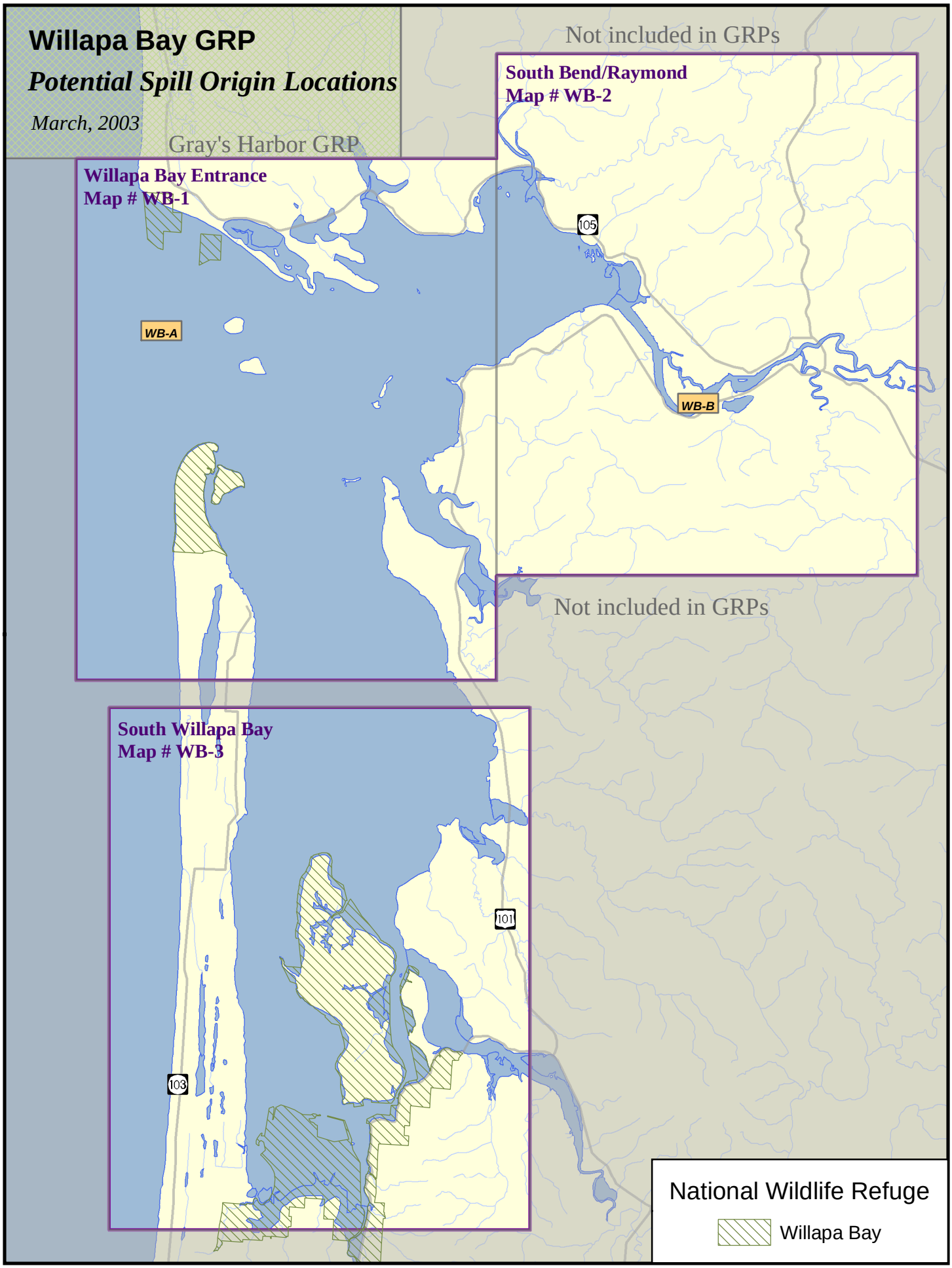
All response strategies fall into one of three major techniques that may be utilized either individually or in combination. The strategies listed in Section 4.2 are based on the following techniques, and are explained in detail in Section 4.3:

Dispersants: Washington State Policy currently does not allow use of dispersants in this area. Certain chemicals break up slicks on the water. Dispersants can decrease the severity of a spill by speeding the dissipation of certain oil types. Their use will require approval of the Unified Command. Dispersants will only be used in offshore situations under certain conditions, until further determinations are made by the Area Committee and published in the Area Contingency Plan.

In Situ Burning: Approval to burn in this area is unlikely due to the proximity of population to a potential burn site. Burning requires the authorization of the Unified Command, who determine conformance of a request to burn with the guidelines set forth in the Area Plan. This option is preferable to allowing a slick to reach the shore provided that population areas are not exposed to excessive smoke. Under the right atmospheric conditions, a burn can be safely conducted in relative close proximity to human population. This method works on many types of oil, and requires special equipment including a fire boom and igniters.

Mechanical Recovery and Protection Strategies: If a spill is too close to shore to use In Situ burning or dispersants, the key strategies are skimming and use of collection, diversion, or exclusion booming to contain and recover the oil, and prevent it from entering areas with sensitive wildlife and fisheries resources. These options are described in detail in Appendix A. Specific skimming strategies are not listed in the maps and matrices, but skimming should be used whenever possible and is often the primary means of recovering oil and protecting resources, especially when booming is not possible or feasible.

Priorities: The strategy priority tables (Section 4.2.) were developed using specific locations where spills are likely to occur. Trajectory modeling was used for each of these "Potential Spill Origins" to identify sensitive resources that would likely be impacted within the initial hours of the spill. A booming strategy priority table was developed for each of the "Potential Spill Origins" based on the sensitivity of resources, feasibility, etc. **Booming strategies should be deployed following the priority table for the "Potential Spill Origin" closest to the actual spill origin.** The map on page 4-2 shows the locations of all Potential Spill Origins for the Willapa Bay GRP. The booming strategies indicated in the priority tables are explained in detail in the Maps & Matrices section (Section 4.3.). It is implied that control and containment at the source is the number one priority of any response. If in the responder's best judgment this is not feasible, then the priorities laid out in the priority tables take precedence over containment and control.


Willapa Bay GRP
Potential Spill Origin Locations
March, 2003
Gray's Harbor GRP
Not included in GRPs
South Bend/Raymond
Map # WB-2
Willapa Bay Entrance
Map # WB-1
105
WB-A
WB-B
Not included in GRPs
South Willapa Bay
Map # WB-3
101
103
National Wildlife Refuge
Willapa Bay

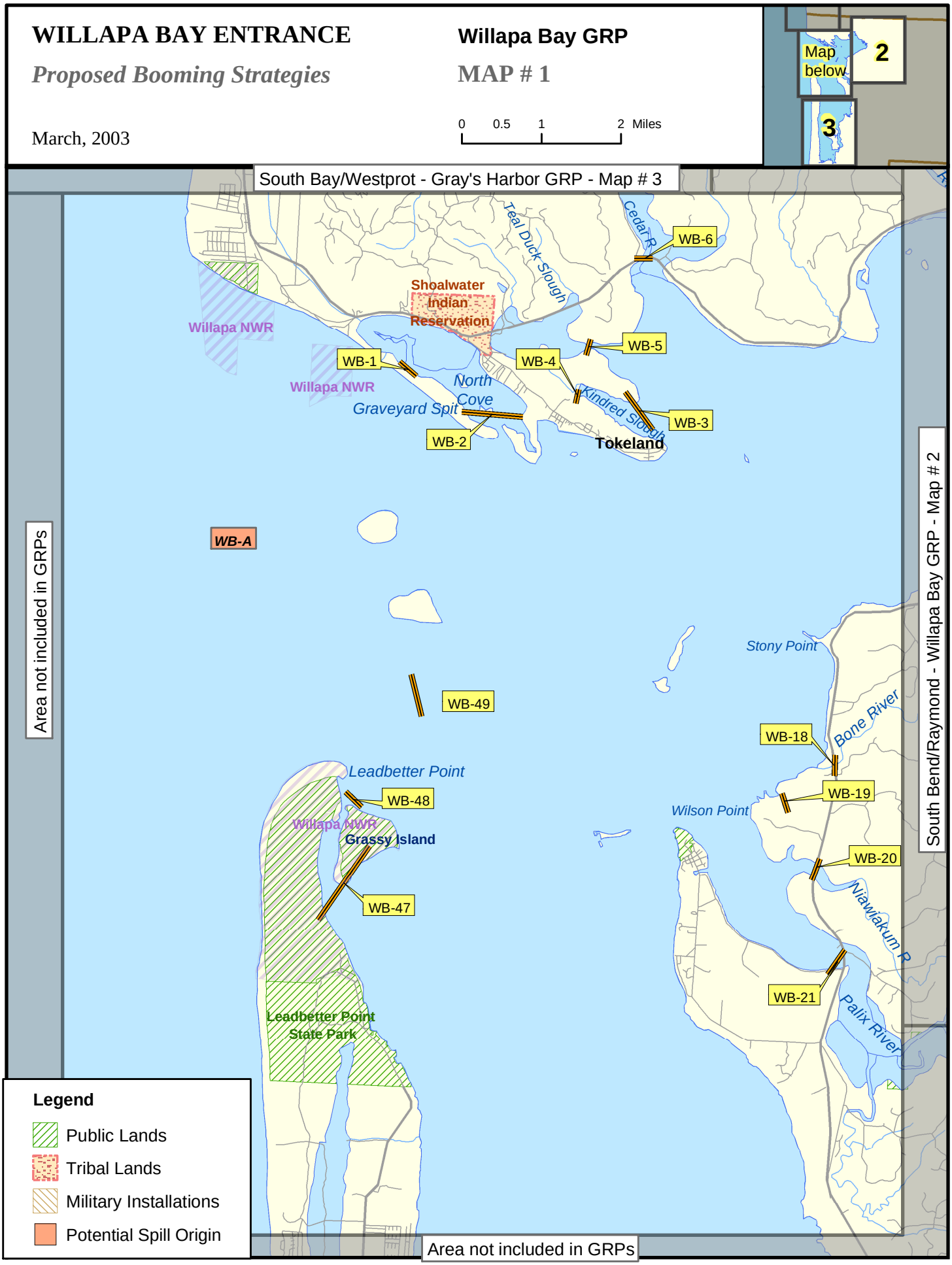
4.2.2 Booming Strategy Priority Tables

Table 4-1

Potential Spill Origin: WB-A - Oil entering Willapa Bay on a flood tide from a source outside of the bay			
BOOMING PRIORITY	STRATEGY NUMBER	MAP PAGE NUMBER	COMMENTS
1	WB-1	4-5	
2	WB-2	4-5	
3	WB-47	4-5	
4	WB-48	4-5	
5	WB-3	4-5	
6	WB-4	4-5	Tide Gate
7	WB-5	4-5	Tide Gate
8	WB-6	4-5	
9	WB-7	4-6	
10	WB-8	4-6	
11	WB-18	4-5	
12	WB-19	4-5	
13	WB-20	4-5	
14	WB-21	4-5	
15	WB-12	4-6	
16	WB-15	4-6	
17	WB-9	4-6	
18	WB-10	4-6	Tide Gate
19	WB-16	4-6	
20	WB-17	4-6	

Table 4-4

Potential Spill Origin: WB-B - Oil entering Willapa Bay on an ebb tide from a source in the Willapa River			
BOOMING PRIORITY	STRATEGY NUMBER	MAP PAGE NUMBER	COMMENTS
1	WB-15	4-6	
2	WB-14	4-6	
3	WB-12	4-6	
4	WB-16	4-6	
5	WB-17	4-6	
6	WB-3	4-5	
7	WB-5	4-5	
8	WB-2	4-5	
9	WB-1	4-5	
10	WB-48	4-5	


WILLAPA BAY ENTRANCE
Proposed Booming Strategies
March, 2003
Willapa Bay GRP
MAP # 1
0 0.5 1 2 Miles
Map below
2
3
South Bay/Westprot - Gray's Harbor GRP - Map # 3
Area not included in GRPs
South Bend/Raymond - Willapa Bay GRP - Map # 2
Area not included in GRPs
Teal Duck Slough
Cedar R
WB-6
Shoalwater Indian Reservation
Willapa NWR
WB-1
WB-4
WB-5
North Cove
Graveyard Spit
Kindred Slough
WB-3
WB-2
Tokeland
WB-A
Stony Point
WB-49
Bone River
WB-18
WB-19
Leadbetter Point
WB-48
Willapa NWR
Grassy Island
Wilson Point
WB-20
WB-47
Niawiakum R
WB-21
Palix River
Leadbetter Point State Park
Legend
Public Lands
Tribal Lands
Military Installations
Potential Spill Origin

SOUTH BEND/RAYMOND

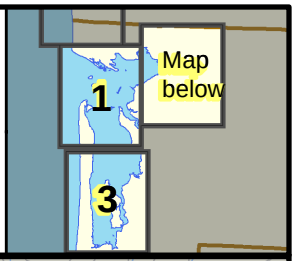
Proposed Booming Strategies

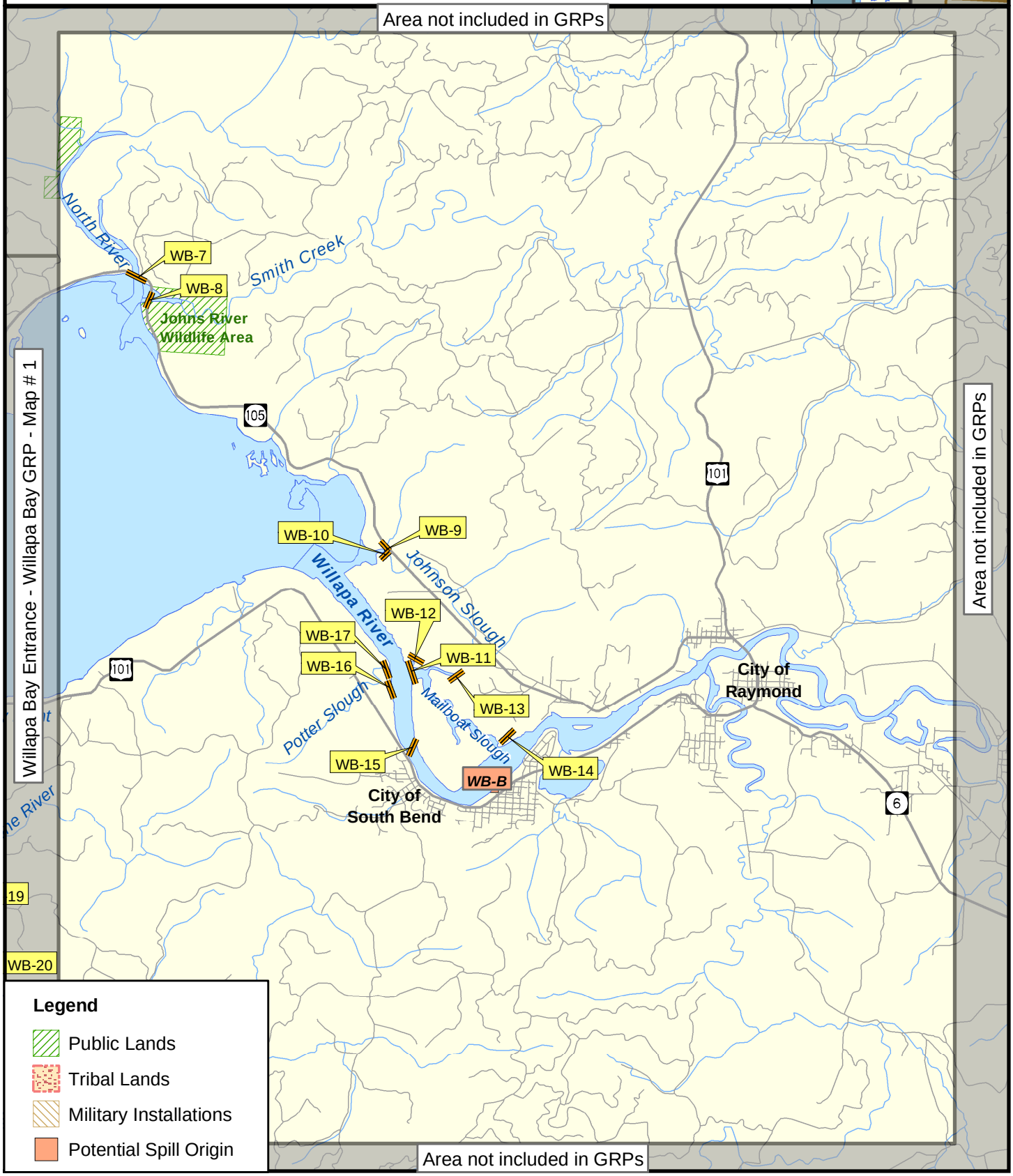
March, 2003

Willapa Bay GRP

MAP # 2

0 0.5 1 2 Miles





SOUTH WILLAPA BAY

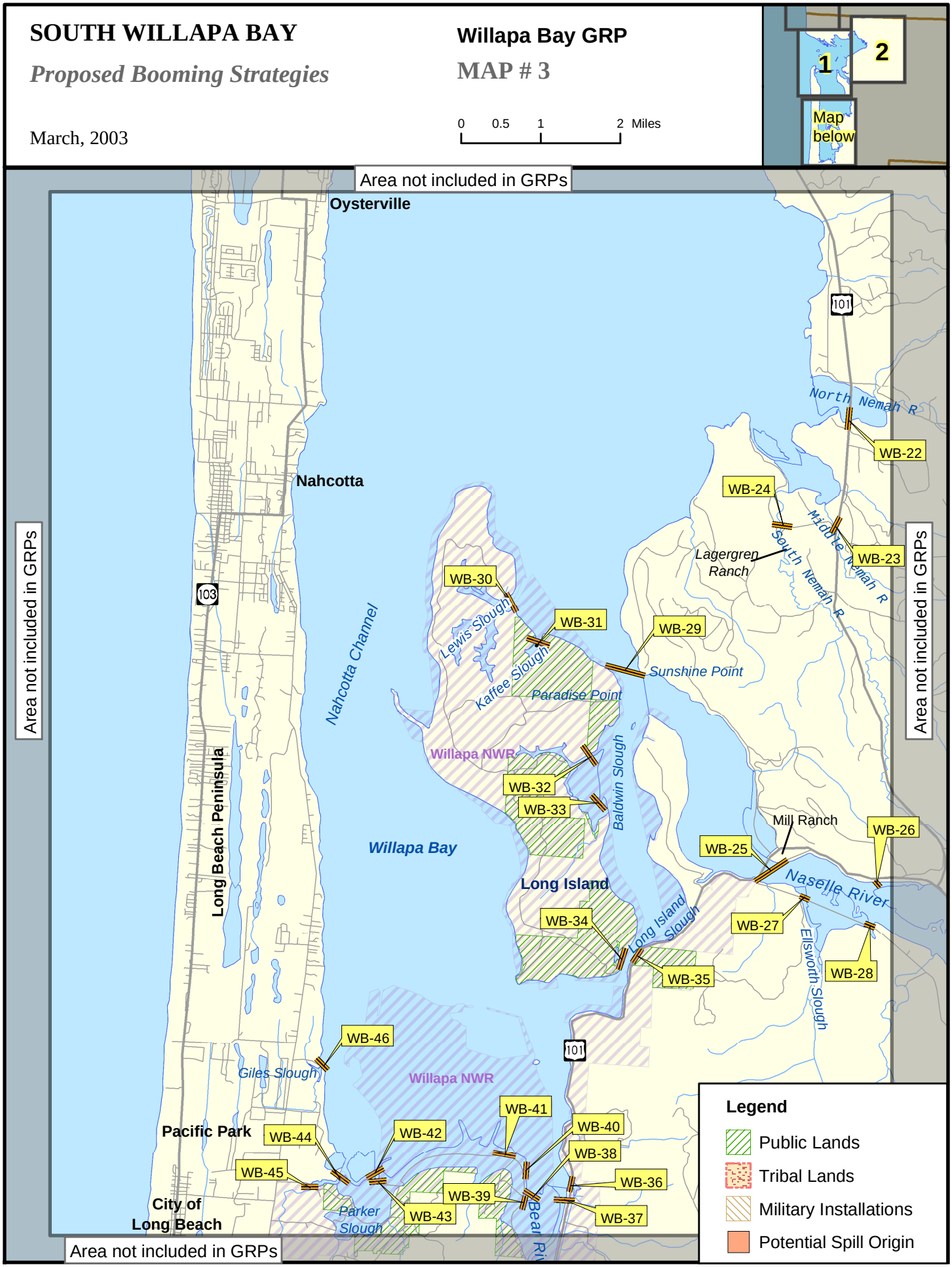
Proposed Booming Strategies

March, 2003

Willapa Bay GRP

MAP # 3

0 0.5 1 2 Miles



4.3.2 Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
WB-1		North Cove PAC0023 46º-43.153'N 124º-02.392'W	Exclusion - Prevent oil from moving into marsh.	900'	Deploy boom across the west opening to marsh. Area nearly dry at low tide.	Tokeland Marina (PAC0042).	By boat only from Tokeland Marina.	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-2		North Cove 46º-42.456'N 124º-00.738'W	Exclusion - Prevent oil from moving into marsh.	1500'	Deploy boom at angle to close off east entrance to marsh. Place boom during flood tide or will need ATV's or helicopter. Area nearly dry at low tide.	Tokeland Marina (PAC0042).	By boat only from Tokeland Marina.	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-3		Kindred Slough PAC0048 46º-42.562'N 123º-58.268'W	Exclusion - Prevent oil from moving into slough.	2400'	Install boom at an angle across slough entrance. Site can only be boomed at high tide.	Tokeland Marina (PAC0042).	By boat only from Tokeland Marina.	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-4		Kindred Slough Tide Gate PAC0047 46º-42.917'N 123º-59.482'W	Exclusion - Keep oil out of slough.	100'	Close tide gate. Deploy boom in front of tide gate if gate cannot be closed or if it leaks.	Tokeland Marina (PAC0042).	Must cross private farm land to get to tide gate, access from Highway 105 at north end of levee road. Permission is required or use helicopter.	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-5		Teal Duck Slough Tide Gate PAC0053 46º-42.398'N 123º-59.326'W	Exclusion - Keep oil out of slough.	100'	Close tide gate. Deploy boom in front of tide gate if gate cannot be closed or if it leaks.	Tokeland Marina (PAC0042).	Must cross private farm land to get to tide gate, access from Highway 105 at north end of levee road. Permission is required or use helicopter.	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-6		Cedar River PAC0060 46º-44.398'N 123º-58.570'W	Exclusion - Prevent oil from moving up river.	300'	Install boom at an angle across river mouth downstream of bridge at Highway 105. River may have tide gate (need to verify).	Stage on Hwy 105 at site.	Take Hwy 105 from Raymond toward Tokeland.	Salmon, waterfowl concentrations.

4.3.2 Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
WB-7		North River PAC0083 46º-45.040'N 123º-53.187'W	Exclusion - Prevent oil from moving up river.	600'	Install boom at an angle across river at bridge on Highway 105.	North River Resort or Smith Creek. Both sites have launch ramps.	Take Hwy 105 west from Raymond to North River Bridge, 10.5 miles.	Salmon, waterfowl concentrations.
WB-8		Smith Creek PAC0083 46º-44.815'N 123º-53.085'W	Exclusion - Prevent oil from moving up creek.	400'	Install boom at an angle across creek at bridge on Highway 105.	Smith Creek boat launch.	Take Hwy 105 west from Raymond to Smith Creek Bridge, 10 miles.	Salmon, waterfowl concentrations.
WB-9		Fleiss Creek PAC0098 46º-42.387'N 123º-49.389'W	Exclusion - Prevent oil from moving into slough/ creek mouth.	200'	Install boom at an angle across slough/ creek at bridge on Highway 105.	Stage along Hwy 105.	Take Hwy 105 from Raymond toward Tokeland. Go 5.4 miles from turnoff of Hwy 101 onto Hwy 105.	Salmon, shorebird and waterfowl concentrations, slough and marsh habitat.
WB-10		Johnson Slough Tide Gate PAC0098 46º-42.337'N 123º-49.345'W	Exclusion - Keep oil out of slough.	100'	Close tide gate. Deploy boom in front of tide gate if gate cannot be closed or if it leaks.	Stage along Hwy 105.	Take road from Highway 105 to Willapa Bay Airport, dike access road is off airport road.	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-11		Mailboat Slough (west entrance) PAC0103 46º-41.150'N 123º-48.935'W	Exclusion - Keep oil out of slough.	1300'	Deploy boom across slough entrance. Must install during high tide.	Helen Davis Memorial Park at west end of South Bend. Park has boat launch. (PAC0145).	From Raymond, go west on Hwy 101 to South Bend. Boat ramp is at west end of town.	Shorebird and waterfowl concentrations, slough and marsh habitat.

4.3.2 Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
WB-12		Mailboat Slough (middle channel) PAC0103 46º-41.115'N 123º-48.250'W	Exclusion - Keep oil out of slough.	100'	Close tide gate. Deploy boom in front of tide gate if gate cannot be closed or if it leaks.	Helen Davis Memorial Park at west end of South Bend. Park has boat launch. (PAC0145).	From Raymond, go west on Hwy 101 to South Bend. Boat ramp is at west end of town.	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-13		Mailboat Slough (north channel) PAC0103 46º-41.285'N 123º-48.885'W	Exclusion - Keep oil out of slough.	100'	Close tide gate. Deploy boom in front of tide gate if gate cannot be closed or if it leaks.	Helen Davis Memorial Park at west end of South Bend. Park has boat launch. (PAC0145).	From Raymond, go west on Hwy 101 to South Bend. Boat ramp is at west end of town.	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-14		Mailboat Slough (east entrance) PAC0112 46º-40.422'N 123º-47.589'W	Exclusion - Prevent oil from moving into slough.	200'	Deploy boom at an angle across slough entrance.	Helen Davis Memorial Park at west end of South Bend. Park has boat launch. (PAC0145).	From Raymond, go west on Hwy 101 to South Bend. Boat ramp is at west end of town.	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-15		Willapa River PAC0144 46º-40.283'N 123º-48.908'W	Exclusion/ Collection - Prevent oil from moving up or down river.	1000'	Deploy boom at an 45-60 deg. angle across river. Use boat launch for collection. This strategy can also be used for spills upstream to keep oil out of the bay.	Helen Davis Memorial Park at west end of South Bend. Park has boat launch. (PAC0145).	From Raymond, go west on Hwy 101 to South Bend. Boat ramp is at west end of town.	Salmon, shorebird and waterfowl concentrations, slough and marsh habitat.

4.3.2 Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
WB-16		Potter Slough (south entrance) PAC0147 46º-40.955'N 123º-49.269'W	Exclusion - Prevent oil from moving into slough.	250'	Deploy boom across slough entrance. Must install at high tide.	Helen Davis Memorial Park at west end of South Bend. Park has boat launch. (PAC0145).	From Raymond, go west on Hwy 101 to South Bend. Boat ramp is at west end of town.	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-17		Potter Slough (north entrance) PAC0148 46º-41.138'N 123º-49.269'W	Exclusion - Prevent oil from moving into slough.	250'	Deploy boom across slough entrance. Must install at high tide.	Helen Davis Memorial Park at west end of South Bend. Park has boat launch. (PAC0145).	From Raymond, go west on Hwy 101 to South Bend. Boat ramp is at west end of town.	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-18		Bone River PAC0174 46º-38.936'N 123º-55.169'W	Exclusion - Prevent oil from moving up river.	300'	Deploy boom at an angle across river on west side of bridge on Highway 101.	Stage at north end of Bone River Bridge just off Hwy 101.	Take Hwy 101 south from Raymond to Bone River.	Salmon, shorebird and waterfowl concentrations, slough and marsh habitat.
WB-19		Wilson Point Marsh PAC0177 46º-38.536'N 123º-55.892'W	Exclusion - Prevent oil from moving into marsh.	100'	Deploy boom at an angle across marsh entrance near old BLM road.	Stage near site where BLM logging road crosses marsh.	Take Hwy 101 13.5 miles south from Raymond. Turn west onto BLM logging road and follow to marsh.	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-20		Niawiakum River PAC0185 46º-37.821'N 123º-55.475'W	Exclusion - Prevent oil from moving up river.	800'	Deploy boom at an angle across river west of bridge on Highway 101.	Stage just off Hwy 101 at small oyster company on west side of Hwy, north side of river.	Take Hwy 101 14.5 miles south from Raymond to Niawiakum River.	Salmon, shorebird and waterfowl concentrations, slough and marsh habitat.

4.3.2 Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
WB-21		Palix River PAC0191 46º-36.752'N 123º-55.059'W	Exclusion - Prevent oil from moving up river.	1200'	Deploy boom at an angle across river west of bridge on Highway 101.	Stage at boat launch just south of Palix River bridge.	Take Hwy 101 15.8 miles south from Raymond to Palix River. Site is on north side of river.	Salmon, shorebird and waterfowl concentrations, slough and marsh habitat.
WB-22		North Nemah River PAC0239 46º-30.753'N 123º-53.581'W	Exclusion - Prevent oil from moving up river.	750'	Deploy boom at an angle across river mouth west of bridge on Highway 101. Difficult to boom at low water.	Stage near Hwy 101 at N. Nemah River.	Take Hwy 101 south from Raymond to N. Nemah River bridge.	Salmon, shorebird and waterfowl concentrations, slough and marsh habitat.
WB-23		Middle Nemah River PAC0242 46º-29.628'N 123º-54.096'W	Exclusion - Prevent oil from moving up river.	200'	Deploy boom at an angle across river west of bridge on Highway 101.	Stage off Hwy 101 on dirt road (Lagergren Ranch).	Take Hwy 101 south from Raymond to Nemah River area.	Salmon, shorebird and waterfowl concentrations, slough and marsh habitat.
WB-24		South Nemah River PAC0242 46º-29.627'N 123º-54.106'W	Exclusion - Prevent oil from moving up river.	200'	Deploy boom at an angle across river at bridge for Lagergren Ranch.	Stage off Hwy 101 on dirt road (Lagergren Ranch).	Take Hwy 101 south from Raymond to Nemah River area.	Salmon, shorebird and waterfowl concentrations, slough and marsh habitat.
WB-25		Naselle River PAC0272 46º-25.952'N 123º-53.945'W	Exclusion/ Collection - Prevent oil from moving up river.	2000'	Deploy boom at an angle across river on east side of bridge at Highway 101 to collection site on north shore at old Mill Ranch.	Stage at old Mill Ranch site (north side of Naselle Bridge).	By boat only from the Willapa NWR ramp near the south end of Long Island.	Salmon, shorebird and waterfowl concentrations, slough and marsh habitat.
WB-26		Roaring Creek Slough 46º-25.709'N 123º-52.457'W|	Exclusion - Prevent oil from moving into slough.	600'	Deploy boom at an angle across slough entrance.	Stage at old Mill Ranch site (north side of Naselle Bridge).	By boat only from the Willapa NWR ramp near the south end of Long Island.	Shorebird and waterfowl concentrations, slough and marsh habitat.

4.3.2 Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
WB-27		Ellsworth Slough 46º-25.590'N 123º-53.599'W	Exclusion - Prevent oil from moving into slough.	600'	Deploy boom across slough entrance north of bridge at Parpala Road.	Stage at Ellsworth Slough just off of Parpala Road.	Take Hwy 101 south from Raymond to Naselle River Bridge. Cross bridge and take first left (Parpala Road).	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-28		Smith Creek 46º-25.310'N 123º-52.472'W	Exclusion - Prevent oil from moving up creek.	400'	Deploy boom across creek mouth north of bridge at Parpala Road.	Stage along Parpala Road.	Take Hwy 101 south from Raymond to Naselle River Bridge. Cross bridge and take first left (Parpala Road).	Salmon, shorebird and waterfowl concentrations, slough and marsh habitat.
WB-29		Sunshine Point PAC0261 46º-27.936'N 123º-56.203'W	Exclusion - Prevent oil from moving into Naselle River or Long Island Slough.	2400'	Deploy boom at an angle across channel from Sunshine Point to Paradise Point.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	By boat only at high tide from the Willapa NWR ramp near the south end of Long Island.	National Wildlife Refuge - shorebird and waterfowl concentrations, seal haulouts, slough and marsh habitat.
WB-30		Lewis Slough PAC0318 46º-28.535'N 123º-58.328'W	Exclusion - Prevent oil from moving into slough.	1000'	Deploy boom at an angle across slough entrance. Need high tide to boom. Need Refuge permission to access site.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	By boat only at high tide from the Willapa NWR ramp near the south end of Long Island.	National Wildlife Refuge - shorebird and waterfowl concentrations, seal haulouts, slough and marsh habitat.
WB-31		Kaffee Slough PAC0315 46º-28.185'N 123º-57.896'W	Exclusion - Prevent oil from moving into slough.	450'	Deploy boom at an angle across slough entrance. Need high tide to boom. Need Refuge permission to access site.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	By boat only at high tide from the Willapa NWR ramp near the south end of Long Island.	National Wildlife Refuge - shorebird and waterfowl concentrations, seal haulouts, slough and marsh habitat.

4.3.2 Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
WB-32		Baldwin Slough (north entrance) PAC0311 46º-27.036'N 123º-56.945'W	Exclusion - Prevent oil from moving into slough.	400'	Deploy boom at an angle across north slough entrance. Need high tide to boom. Need Refuge permission to access site.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	By boat only at high tide from the Willapa NWR ramp near the south end of Long Island.	National Wildlife Refuge - shorebird and waterfowl concentrations, seal haulouts, slough and marsh habitat.
WB-33		Baldwin Slough (south entrance) PAC0309 46º-26.513'N 123º-56.878'W	Exclusion - Prevent oil from moving into slough.	400'	Deploy boom at an angle across south slough entrance. Need high tide to boom. Need Refuge permission to access site.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	By boat only at high tide from the Willapa NWR ramp near the south end of Long Island.	National Wildlife Refuge - shorebird and waterfowl concentrations, seal haulouts, slough and marsh habitat.
WB-34		Long Island Slough PAC0300 46º-24.731'N 123º-56.249'W	Exclusion - Prevent oil from moving into slough.	900'	Install boom across slough . Need Refuge permission to access site.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	By boat only at high tide from the Willapa NWR ramp near the south end of Long Island.	National Wildlife Refuge - shorebird and waterfowl concentrations, seal haulouts, slough and marsh habitat.
WB-35		Lake at Willapa National Wildlife Refuge Headquarters PAC0295 46º-24.841'N 123º-56.139'W	Exclusion - Keep oil out of lake.	100'	Block culvert with boom or plywood. Discharge from lake will normally keep oil out. Could enter only at high tide.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	Take Hwy 101 south from Raymond to Willapa NWR Headquarters near south end of Long Island.	National Wildlife Refuge - waterfowl concentrations.

4.3.2 Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
WB-36		Tidal marsh at mouth of Bear River PAC0355 46º-22.298'N 123º-57.067'W	Exclusion - Prevent oil from moving into tidal marsh.	400'	Deploy boom across tidal marsh entrance west of bridge at Highway 101.	Stage at Highway 101.	Take Hwy 101 south from Raymond. Deploy boom at bridge at mouth of Bear River. Boat access at high tide only from the refuge ramp.	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-37		Bear River (main channel) PAC0355 46º-22.321'N 123º-57.035'W	Exclusion - Prevent oil from moving up river.	350'	Deploy boom across river mouth near bridge at WB-36.	Stage at Highway 101.	Take Hwy 101 south from Raymond. Deploy boom near bridge at mouth of Bear River. Boat access only from the refuge ramp.	National Wildlife Refuge - salmon, waterfowl concentrations.
WB-38		Bear River (west channel) PAC0361 46º-22.171'N 123º-57.654'W	Exclusion - Prevent oil from moving up river.	150'	Install boom at an angle across river entrance. Refuge permission required.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	Take Hwy 101 south from Raymond. After crossing bridge at mouth of Bear River, take Jeldness Road to dike access road. Boat access at high tide only.	National Wildlife Refuge - salmon, shorebird and waterfowl concentrations, slough and marsh habitat.
WB-39		WBNWR Tide Gate #1 PAC0362 46º-22.277'N 123º-57.756'W	Exclusion - Keep oil out of slough.	100'	Close tide gate. Deploy boom in front of tide gate if gate cannot be closed or if the gate leaks. Refuge permission required.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	Take Hwy 101 south from Raymond. After crossing bridge at mouth of Bear River, take Jeldness Road to dike access road.	National Wildlife Refuge - shorebird and waterfowl concentrations, slough and marsh habitat.

4.3.2 Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
WB-40		WBNWR Tide Gate #2 PAC0362 46º-22.465'N 123º-57.761'W	Exclusion - Keep oil out of slough.	100'	Close tide gate. Deploy boom in front of tide gate if gate cannot be closed or if the gate leaks. Refuge permission required.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	Take Hwy 101 south from Raymond. After crossing bridge at mouth of Bear River, take Jeldness Road to dike access road.	National Wildlife Refuge - shorebird and waterfowl concentrations, slough and marsh habitat.
WB-41		WBNWR Tide Gate #3 PAC0363 46º-22.635'N 123º-57.045'W	Exclusion - Keep oil out of slough.	100'	Close tide gate. Deploy boom infront of tide gate if gate cannot be closed or if the gate leaks. Refuge permission required.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	Take Hwy 101 south from Raymond. After crossing bridge at mouth of Bear River, take Jeldness Road to dike access road.	National Wildlife Refuge - shorebird and waterfowl concentrations, slough and marsh habitat.
WB-42		Parker Slough PAC0368 46º-22.378'N 124º-00.188'W	Exclusion - Keep oil out of slough.	900'	Deploy boom at an angle across slough entrance. Need Refuge permission to access site.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	Take Hwy 101 south from Raymond. After crossing bridge at mouth of Bear River, take Jeldness Road to Parker Slough.	National Wildlife Refuge - shorebird and waterfowl concentrations, slough and marsh habitat.
WB-43		Parker Slough Tide Gate PAC0368 46º-22.220'N 124º-00.384'W	Exclusion - Keep oil out of slough.	100'	Close tide gate. Deploy boom in front of tide gate if gate cannot be closed or if the gate leaks. Refuge permission required.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	Follow directions for WB-44, continue on dike access road to tide gate.	National Wildlife Refuge - shorebird and waterfowl concentrations, slough and marsh habitat.
WB-44		Tarlatt Slough Tide Gate PAC0370 46º-22.202'N 124º-01.091'W	Exclusion - Keep oil out of slough.	100'	Close tide gate. Deploy boom in front of tide gate if gate cannot be closed or if the gate leaks.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	Take Hwy 101 to Peninsula Highway, go north to dirt road 1300' past Pioneer Road, dirt road leads to tide gate.	Shorebird and waterfowl concentrations, slough and marsh habitat.

4.3.2 Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
WB-45		Tarlatt Slough PAC0369 46º-22.410'N 124º-00.532'W	Exclusion - Prevent oil from moving into slough.	480'	Deploy boom at an angle across slough entrance.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	Boat access only at high tide, use ramp at Willapa Bay NWR Headquarters or Nahcotta. Need Willapa NWR permission to access site.	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-46		Giles Slough PAC0375 46º-23.505'N 124º-00.965'W	Exclusion - Prevent oil from moving into slough.	900'	Deploy boom at an angle across slough entrance.	Stage at Willapa Bay NWR Headquarters and boat launch area (PAC0295).	Boat access only at high tide, use ramp at Willapa Bay NWR Headquarters or Nahcotta. Need Willapa NWR permission to access site.	Shorebird and waterfowl concentrations, slough and marsh habitat.
WB-47		Grassy Island (south) PAC0438 46º-37.556'N 124º-02.961'W	Exclusion - Keep oil from moving into marsh area.	1700'	Deploy boom at south end of Grassy Island, high tide only.	Stage at Nahcotta Marina (PAC0403), west of Ocean Park.	Boat access only at high tide, use ramp at Nahcotta or Tokeland. Need Willapa NWR permission to access site.	National Wildlife Refuge - shorebird and waterfowl concentrations, marsh habitat.
WB-48		Grassy Island (north) PAC0438 46º-38.251'N 124º-02.765'W	Exclusion - Keep oil from moving into marsh area.	1000'	Deploy boom at north end of Grassy Island, high tide only. Entrance to marsh is variable and may be blocked with sand.	Stage at Nahcotta Marina (PAC0403), west of Ocean Park.	Boat access only at high tide, use ramp at Nahcotta or Tokeland. Need Willapa NWR permission to access site.	National Wildlife Refuge - shorebird and waterfowl concentrations, marshes.
WB-49		Gunpowder Sands 46º-38.359'N 124º-0.996'W	Deflection - Deflect oil into main channel.	2000'	Angle boom southeast from east side of Gunpowder Sands to deflect oil away.	Stage at Nahcotta Marina (PAC0403), west of Ocean Park.	Boat access only at high tide, use ramp at Nahcotta or Tokeland. Need Willapa NWR permission to access site.	Shorebirds and waterfowl.

APPENDICES

Appendix A: Summary of Protection Techniques

Protection Techniques	Description	Primary Logistical Requirements	Limitations
ONSHORE			
Beach Berms	A berm is constructed along the top of the mid-inter tidal zone from sediments ex-cavated along the downgradient side. The berm should be covered with plastic or geo-textile sheeting to minimize wave erosion.	• Bulldozer/Motor grader -1 • Personnel - equipment operator & 1 worker • Misc. - plastic or geotextile sheeting	• High wave energy • Large tidal range • Strong along shore currents
Geotextiles	A roll of geotextile, plastic sheeting, or other impermeable material is spread along the bottom of the supra-tidal zone & fastened to the underlying logs or stakes placed in the ground.	• Geotextile - 3 m wide rolls • Personnel - 5 • Misc. - stakes or tie-down cord	• Low sloped shoreline • High spring tides • Large storms
Sorbent Barriers	A barrier is constructed by installing two parallel lines of stakes across a channel, fastening wire mesh to the stakes & filling the space between with loose sorbents.	Per 30 meters of barrier • Wire mesh - 70 m x 2 m • Stakes - 20 • Sorbents - 30 m^2 • Personnel - 2 • Misc. - fasteners, support lines, additional stakes, etc.	• Waves > 25 cm • Currents > 0.5 m/s • Tidal range > 2 m
Inlet Dams	A dam is constructed across the channel using local soil or beach sediments to exclude oil from entering channel.	• Loader - 1 • Personnel - equipment operator & 1 worker or several workers w/shovels	• Waves > 25 cm • Tidal range exceeding dam height • Freshwater outflow

NEARSHORE			
Containment Booming	Boom is deployed in a "U" shape in front of the oncoming slick. The ends of the booms are anchored by work boats or drogues. The oil is contained within the "U" & prevented from reaching the shore.	For 150 meters Slick: • Boom - 280 m • Boats - 2 • Personnel - boat crews & 4 boom tenders • Misc. - tow lines, drogues, connectors, etc.	• High winds • Swells > 2 m • Breaking waves > 50 cm • Currents > 1.0 m/s
Exclusion Booming	Boom is deployed across or around sensitive areas & anchored in place. Approaching oil is deflected or contained by boom.	Per 300 meters of Boom • Boats - 1 • Personnel - boat crew & 3 boom tenders • Misc.- 6 anchors, anchor line, buoys, etc.	• Currents > 0.5 m/s • Breaking waves > 50 cm • Water depth > 20 m
Deflection Booming	Boom is deployed from the shoreline away from the approaching slick & anchored or held in place with a work boat. Oil is deflected away from shoreline.	Single Boom, 0.75 m/s knot current • Boom - 60 m • Boats - 1 • Personnel - boat crew + 3 • Misc. - 3 anchors, line, buoys, recovery unit	• Currents > 1.0 m/s • Breaking waves > 50 cm
Diversion Booming	Boom is deployed from the shoreline at an angle towards the approaching slick & anchored or held in place with a work boat. Oil is diverted towards the shoreline for recovery.	Single Boom, 0.75 m/s knot current • Boom - 60 m • boats - 1 • Personnel - boat crew + 3 • Misc. - 3 anchors, line, buoys, recovery unit	• Currents > 1.0 m/s • Breaking waves > 50 cm
Skimming	Self-propelled skimmers work back & forth along the leading edge of a windrow to recover the oil. Booms may be deployed from the front of a skimmer in a "V" configuration to increase sweep width. Portable skimmers are placed within containment booms in the area of heaviest oil concentration.	Self-propelled (None) Towed • Boom - 200 m • Boats - 2 • Personnel - boat crews & 4 boom tenders • Misc. - tow lines, bridles, connectors, etc. Portable • Hoses - 30 m discharge • Oil storage - 2000 liters	• High winds • Swells > 2 m • Breaking waves > 50 cm • Currents > 1.0 m/s

Appendix B: Original Geographic Response Plan Contributors

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Appendix C: Geographic Response Plan Comments/Corrections/Suggestions

If you have any questions regarding this document or find any errors, please notify one of the following agencies: or use tear out sheet (page C-3)

- Washington Department of Ecology, SPPR program, Natural Resources Unit
- USCG Marine Safety Office Puget Sound, Planning Department
- USCG Marine Safety Office Portland
- Oregon Department of Environmental Quality
- Idaho Emergency Response Commission
- Environmental Protection Agency Region 10

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Emergency Response Branch
1200 Sixth Avenue
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Geographic Response Plan

Comments/Corrections/Suggestions

Directions:
Fill in your name, address, agency, and phone number. Fill in the blanks regarding the location of information in the plan being commented on. Make comments in the space provided. Add extra sheets as necessary. Submit to:

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Spills Program
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Olympia, WA 98504-7600
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Name:_____ Title:_____ Agency:_____

Address:_____

City: _____ State/Province:_____ Zip/Postal Code:_____

Phone: (____) _____ E-Mail:_____

GRP:_____Page Number:_____

Location on page (chapter, section, paragraph) (e.g. 2.1, paragraph 3):_____

Comments:_____

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